

APPENDIX A

**ENCODER'S MAP OF PATENT CLAIMS**

(← + is "further comprises")

1. Encoder (*lossless compression*)
  2. Encoder ← + Quantizer (*lossy compression*)
  3. Encoder ← + Synchronization memory
  4. Encoder ← + Color space converter
  5. N-level direct subband transformer ←  $N \times$  Single-level direct subband transformer
    6. N-level direct subband transformer ← 1-D low-pass
    7. N-level direct subband transformer ← 2-D low-pass
  8. Single-level direct subband transformer ← Horizontal & vertical direct filter
    9. Horizontal direct filter  $\neq$  Vertical direct filter
    10. At least one horizontal & vertical direct filter ← Direct non-stationary filter
  11. Single-level direct subband transformer ← Direct filter
    12. Direct filter ← Direct non-stationary filter
      13. Direct non-stationary filter ← Direct non-stationary filter cells
        14. Direct non-stationary filter cells ← Filter cells + Switches
          15. Position of switches for filtering pixels
          16. Position of switches for filtering lines
        17. Direct non-stationary filter ← + Gain multipliers
        18. Filter device ← General non-stationary filter
          19. Multiplier ← Shifting means (*Markush group*)
          20. Filter device ← +  $N_1$  &  $N_2$ 
            21.  $N_1$  &  $N_2$  ← Shifting means (*Markush group*)
      22. Filter device ← First order device
        23. Multiplier ← Shifting means (*Markush group*)
          24. Shifting right data for two bit positions
          25. Shifting right data for one bit position
          26. Subtraction instead of addition
    27. Filter device ← Second order device
      28. Multiplier ← Shifting means (*Markush group*)
        29. Shifting right data for four bit positions
        30. Subtraction instead of addition

31. Encoding probability estimator  $\leftarrow$  Adaptive histogram updating means
32. Adaptive histogram updating means  $\leftarrow$  Low-pass filtering probabilities (*Markush group*)
33. Adaptive histogram updating means  $\leftarrow$  + Dominant pole adapter
34. Adapter dominantnog pola  $\leftarrow$  Dominant pole divider
35. Entropy encoder  $\leftarrow$  Multiplier  $r \cdot Q(x)$ ,  $Q(x) \in \{U(x), u(x)\}$  (*Markush group*)
36. Multiplier  $\leftarrow$  Simplified multiplier + Left shifter for  $l$  bit positions
37. Multiplier  $\leftarrow$  Left shifter of  $Q(x)$  for  $l$  bit positions
38. Multiplier  $\leftarrow$  Means for zeroing and means for shifting for 1 bit position + adder + left shifter for  $l$  bit positions
39. Multiplier  $\leftarrow$  Means for zeroing and means for shifting for 2 bit positions + adder + left shifter for  $l$  bit positions
40. Entropy encoder  $\leftarrow$  Divider  $r = \lfloor R/Total \rfloor$
41. Divider  $\leftarrow$  Right shifter for  $w_3 = \log_2(Total)$  bit position
42. Encoding probability estimator  $\leftarrow$  Splitter  $C$  into  $S + MS + R$
43.  $MS$  definition +  $R$  definition
44. Entropy encoder  $\leftarrow$  Encoder  $R$
45. Encoding probability estimator  $\leftarrow$  + Context modeler
46. North-east, north, north-west and west context modeler
47. Encoding probability estimator  $\leftarrow$  +  $\overline{MS}$  determinant
48. Encoding probability estimator  $\leftarrow$  + Maximum mean value  $MC$  limiter
49. Entropy encoder  $\leftarrow$  Magnitude range encoder  $MS + h[MC]$
50. Encoding probability estimator  $\leftarrow$  +  $h[MC]$  updating
51. Encoding probability estimator  $\leftarrow$  + Ternary context  $TC$  determinant
52. Encoding probability estimator  $\leftarrow$  + Sign inverter using NEG
53. Encoding probability estimator  $\leftarrow$  +  $TC$  translator into  $SC$  using CTX
54. Entropy encoder  $\leftarrow$  Sign range encoder +  $g[SC]$
55. Encoding probability estimator  $\leftarrow$  +  $g[SC]$  updating

**EQUIVALENT ENCODER CLAIMS**  
**(INDEPENDENT CLAIM OR**  
**DEPENDENT CLAIM / CLAIM FROM WHICH IT DEPENDS ON)**

| MAP   | APPARATUS | METHOD  | ARTICLE OF<br>MANUFACTURE | PROPAGATED<br>SIGNAL |
|-------|-----------|---------|---------------------------|----------------------|
| 1     | 1         | 113     | 225, 449/113              | 337, 451/113         |
| 2/1   | 2/1       | 114/113 | 226/225                   | 338/337              |
| 3/1   | 3/1       | 115/113 | 227/225                   | 339/337              |
| 4/1   | 4/1       | 116/113 | 228/225                   | 340/337              |
| 5/1   | 5/1       | 117/113 | 229/225                   | 341/337              |
| 6/5   | 6/5       | 118/117 | 230/229                   | 342/341              |
| 7/5   | 7/5       | 119/117 | 231/229                   | 343/341              |
| 8/1   | 8/1       | 120/113 | 232/225                   | 344/337              |
| 9/8   | 9/8       | 121/120 | 233/232                   | 345/344              |
| 10/8  | 10/8      | 122/120 | 234/232                   | 346/344              |
| 11/1  | 11/1      | 123/113 | 235/225                   | 347/337              |
| 12/11 | 12/11     | 124/123 | 236/235                   | 348/347              |
| 13/12 | 13/12     | 125/124 | 237/236                   | 349/348              |
| 14/13 | 14/13     | 126/125 | 238/237                   | 350/349              |
| 15/14 | 15/14     | 127/126 | 239/238                   | 351/350              |
| 16/14 | 16/14     | 128/126 | 240/238                   | 352/350              |
| 17/14 | 17/14     | 129/126 | 241/238                   | 353/350              |
| 18/14 | 18/14     | 130/126 | 242/238                   | 354/350              |
| 19/18 | 19/18     | 131/130 | 243/242                   | 355/354              |
| 20/18 | 20/18     | 132/130 | 244/242                   | 356/354              |
| 21/20 | 21/20     | 133/132 | 245/244                   | 357/356              |
| 22/14 | 22/14     | 134/126 | 246/238                   | 358/350              |
| 23/22 | 23/22     | 135/134 | 247/246                   | 359/358              |
| 24/23 | 24/23     | 136/135 | 248/247                   | 360/359              |
| 25/23 | 25/23     | 137/135 | 249/247                   | 361/359              |
| 26/25 | 26/25     | 138/137 | 250/249                   | 362/361              |
| 27/14 | 27/14     | 139/126 | 251/238                   | 363/350              |
| 28/27 | 28/27     | 140/139 | 252/251                   | 364/363              |
| 29/28 | 29/28     | 141/140 | 253/252                   | 365/364              |
| 30/29 | 30/29     | 142/141 | 254/253                   | 366/365              |
| 31/1  | 31/1      | 143/113 | 255/225                   | 367/337              |
| 32/31 | 32/31     | 144/143 | 256/255                   | 368/367              |
| 33/32 | 33/32     | 145/144 | 257/256                   | 369/368              |
| 34/33 | 34/33     | 146/145 | 258/257                   | 370/369              |
| 35/1  | 35/1      | 147/113 | 259/225                   | 371/337              |
| 36/35 | 36/35     | 148/147 | 260/259                   | 372/371              |
| 37/35 | 37/35     | 149/147 | 261/259                   | 373/371              |

|       |       |         |         |         |
|-------|-------|---------|---------|---------|
| 38/35 | 38/35 | 150/147 | 262/259 | 374/371 |
| 39/35 | 39/35 | 151/147 | 263/259 | 375/371 |
| 40/1  | 40/1  | 152/113 | 264/225 | 376/337 |
| 41/40 | 41/40 | 153/152 | 265/264 | 377/376 |
| 42/1  | 42/1  | 154/113 | 266/225 | 378/337 |
| 43/42 | 43/42 | 155/154 | 267/266 | 379/378 |
| 44/42 | 44/42 | 156/154 | 268/266 | 380/378 |
| 45/42 | 45/42 | 157/154 | 269/266 | 381/378 |
| 46/45 | 46/45 | 158/157 | 270/269 | 382/381 |
| 47/45 | 47/45 | 159/157 | 271/269 | 383/381 |
| 48/47 | 48/47 | 160/159 | 272/271 | 384/383 |
| 49/48 | 49/48 | 161/160 | 273/272 | 385/384 |
| 50/48 | 50/48 | 162/160 | 274/272 | 386/384 |
| 51/45 | 51/45 | 163/157 | 275/269 | 387/381 |
| 52/51 | 52/51 | 164/163 | 276/275 | 388/387 |
| 53/51 | 53/51 | 165/163 | 277/275 | 389/387 |
| 54/53 | 54/53 | 166/165 | 278/277 | 390/389 |
| 55/53 | 55/53 | 167/165 | 279/277 | 391/389 |

**DECODER'S MAP OF PATENT CLAIMS**

(← + is "further comprises")

1. Decoder (*lossless decompression*)
  2. Decoder ← + Dequantizer (*lossy decompression*)
  3. Decoder ← + Synchronization memory
  4. Decoder ← + Color space converter
  5. N-level inverse subband transformer ←  $N \times$  Single-level inverse subband transformer
    6. N-level inverse subband transformer ← 1-D low-pass
    7. N-level inverse subband transformer ← 2-D low-pass
  8. Single-level inverse subband transformer ← Horizontal & vertical inverse filter
    9. Horizontal inverse filter  $\neq$  Vertical inverse filter
    10. At least one horizontal & vertical inverse filter ← Inverse non-stationary filter
  11. Single-level inverse subband transformer ← Inverse filter
    12. Inverse filter ← Inverse non-stationary filter
      13. Inverse non-stationary filter ← Inverse non-stationary filter cells
        14. Inverse non-stationary filter cells ← Filter cells + Switches
          15. Position of switches for filtering pixels
          16. Position of switches for filtering lines
          17. Inverse non-stationary filter ← + Gain multipliers
          18. Filter device ← General non-stationary filter
            19. Multiplier ← Shifting means (*Markush group*)
            20. Filter device ← +  $N_1$  &  $N_2$ 
              21.  $N_1$  &  $N_2$  ← Shifting means (*Markush group*)
          22. Filter device ← First order device
            23. Multiplier ← Shifting means (*Markush group*)
              24. Shifting right data for one bit position
              25. Shifting right data for two bit positions
              26. Subtraction instead of addition
          27. Filter device ← Second order device
            28. Multiplier ← Shifting means (*Markush group*)
              29. Shifting right data for four bit positions
              30. Subtraction instead of addition

31. Decoding probability estimator  $\leftarrow$  Adaptive histogram updating means
32. Adaptive histogram updating means  $\leftarrow$  Low-pass filtering probabilities (*Markush group*)
33. Adaptive histogram updating means  $\leftarrow$  + Dominant pole adapter
34. Adapter dominantnog pola  $\leftarrow$  Dominant pole divider
35. Entropy decoder  $\leftarrow$  Multiplier  $r \cdot Q(x)$ ,  $Q(x) \in \{U(x), u(x)\}$  (*Markush group*)
36. Multiplier  $\leftarrow$  Simplified multiplier + Left shifter for  $l$  bit positions
37. Multiplier  $\leftarrow$  Left shifter of  $Q(x)$  for  $l$  bit positions
38. Multiplier  $\leftarrow$  Means for zeroing and means for shifting for one bit position + adder + left shifter for  $l$  bit positions
39. Multiplier  $\leftarrow$  Means for zeroing and means for shifting for two bit positions + adder + left shifter for  $l$  bit positions
40. Entropy decoder  $\leftarrow$  Divider  $r = \lfloor R/Total \rfloor$
41. Divider  $\leftarrow$  Right shifter for  $w_3 = \log_2(Total)$  bit position
42. Entropy decoder  $\leftarrow$  Divider  $\lfloor B/r \rfloor$
43. Divider  $\leftarrow$  Simplified divider + right shifter for  $l$  bit positions
44. Divider  $\leftarrow$  Multiplier with predefined number + right shifter for  $l$  plus predefined number of bit positions
45. Decoding probability estimator  $\leftarrow$  Builder  $C$  from  $S + MS + R$
46. Entropy decoder  $\leftarrow$  Decoder  $R$   $MS$  definition +  $R$  definition
47. Decoding probability estimator  $\leftarrow$  + context modeler
48. North-east, north, north-west and west context modeler
49. Decoding probability estimator  $\leftarrow$  + Mean value  $\overline{MS}$  determinator
50. Decoding probability estimator  $\leftarrow$  + Maximum mean  $\overline{MS}$  limiter
51. Entropy decoder  $\leftarrow$  Magnitude range decoder  $MS + h[MC]$
52. Decoding probability estimator  $\leftarrow$  +  $h[MC]$  updating
53. Decoding probability estimator  $\leftarrow$  + Ternary context  $TC$  determinator
54. Decoding probability estimator  $\leftarrow$  +  $TC$  translator into  $SC$  using  $CTX$
55. Entropy decoder  $\leftarrow$  Sign range decoder +  $g[SC]$
56. Decoding probability estimator  $\leftarrow$  +  $g[SC]$  updating
57. Decoding probability estimator  $\leftarrow$  + Sign inverter using NEG

**EQUIVALENT DECODER CLAIMS**  
**(INDEPENDENT CLAIM OR**  
**DEPENDENT CLAIM / CLAIM FROM WHICH IT DEPENDS ON)**

| MAP   | APPARATUS | METHOD  | ARTICLE OF<br>MANUFACTURE | PROPAGATED<br>SIGNAL |
|-------|-----------|---------|---------------------------|----------------------|
| 1     | 56        | 168     | 280, 450/168              | 392, 452/168         |
| 2/1   | 57/56     | 169/168 | 281/280                   | 393/392              |
| 3/1   | 58/56     | 170/168 | 282/280                   | 394/392              |
| 4/1   | 59/56     | 171/168 | 283/280                   | 395/392              |
| 5/1   | 60/56     | 172/168 | 284/280                   | 396/392              |
| 6/5   | 61/60     | 173/172 | 285/284                   | 397/396              |
| 7/5   | 62/60     | 174/172 | 286/284                   | 398/396              |
| 8/1   | 63/56     | 175/168 | 287/280                   | 399/392              |
| 9/8   | 64/63     | 176/175 | 288/287                   | 400/399              |
| 10/8  | 65/63     | 177/175 | 289/287                   | 401/399              |
| 11/1  | 66/56     | 178/168 | 290/280                   | 402/392              |
| 12/11 | 67/66     | 179/178 | 291/290                   | 403/402              |
| 13/12 | 68/67     | 180/179 | 292/291                   | 404/403              |
| 14/13 | 69/68     | 181/180 | 293/292                   | 405/404              |
| 15/14 | 70/69     | 182/181 | 294/293                   | 406/405              |
| 16/14 | 71/69     | 183/181 | 295/293                   | 407/405              |
| 17/14 | 72/69     | 184/181 | 296/293                   | 408/405              |
| 18/14 | 73/69     | 185/181 | 297/293                   | 409/405              |
| 19/18 | 74/73     | 186/185 | 298/297                   | 410/409              |
| 20/18 | 75/73     | 187/185 | 299/297                   | 411/409              |
| 21/20 | 76/75     | 188/187 | 300/299                   | 412/411              |
| 22/14 | 77/69     | 189/181 | 301/293                   | 413/405              |
| 23/22 | 78/77     | 190/189 | 302/301                   | 414/413              |
| 24/23 | 79/78     | 191/190 | 303/302                   | 415/414              |
| 25/23 | 80/78     | 192/190 | 304/302                   | 416/414              |
| 26/25 | 81/80     | 193/192 | 305/304                   | 417/416              |
| 27/14 | 82/69     | 194/181 | 306/293                   | 418/405              |
| 28/27 | 83/82     | 195/194 | 307/306                   | 419/418              |
| 29/28 | 84/83     | 196/195 | 308/307                   | 420/419              |
| 30/29 | 85/84     | 197/196 | 309/308                   | 421/420              |
| 31/1  | 86/56     | 198/168 | 310/280                   | 422/392              |
| 32/31 | 87/86     | 199/198 | 311/310                   | 423/422              |
| 33/32 | 88/87     | 200/199 | 312/311                   | 424/423              |
| 34/33 | 89/88     | 201/200 | 313/312                   | 425/424              |
| 35/1  | 90/56     | 202/168 | 314/280                   | 426/392              |
| 36/35 | 91/90     | 203/202 | 315/314                   | 427/426              |
| 37/35 | 92/90     | 204/202 | 316/314                   | 428/426              |



|       |         |         |         |         |
|-------|---------|---------|---------|---------|
| 38/35 | 93/90   | 205/202 | 317/314 | 429/426 |
| 39/35 | 94/90   | 206/202 | 318/314 | 430/426 |
| 40/1  | 95/56   | 207/168 | 319/280 | 431/392 |
| 41/40 | 96/95   | 208/207 | 320/319 | 432/431 |
| 42/1  | 97/56   | 209/168 | 321/280 | 433/392 |
| 43/42 | 98/97   | 210/209 | 322/321 | 434/433 |
| 44/42 | 99/97   | 211/209 | 323/321 | 435/433 |
| 45/1  | 100/56  | 212/168 | 324/280 | 436/392 |
| 46/45 | 101/100 | 213/212 | 325/324 | 437/436 |
| 47/45 | 102/100 | 214/212 | 326/324 | 438/436 |
| 48/47 | 103/102 | 215/214 | 327/326 | 439/438 |
| 49/47 | 104/102 | 216/214 | 328/326 | 440/438 |
| 50/49 | 105/104 | 217/216 | 329/328 | 441/440 |
| 51/50 | 106/105 | 218/217 | 330/329 | 442/441 |
| 52/51 | 107/106 | 219/218 | 331/330 | 443/442 |
| 53/47 | 108/102 | 220/214 | 332/326 | 444/438 |
| 54/53 | 109/108 | 221/220 | 333/332 | 445/444 |
| 55/54 | 110/109 | 222/221 | 334/333 | 446/445 |
| 56/55 | 111/110 | 223/222 | 335/334 | 447/446 |
| 57/55 | 112/110 | 224/222 | 336/334 | 448/446 |